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The Relationship Between Demographic Factors and Prevalence of 10 Healthy Lifestyle Behaviors

Seçilmiş 10 Sağlıklı Yaşam Davranışın Görülme Sıklığı ve Demografik Faktörlerle İlişkisi

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Özet

Amaç: Yaşam tarzı tercihleri, kardiyovasküler hastalıklar ve tüm ölümler ile yakından ilişkilidir. Bu çalışmanın amacı, seçilmiş 10 sağlıklı yaşam davranışın (SYD) toplumdaki görülme sıklığını ve demografik faktörlerle olan ilişkisini ortaya koymaktır. Gereç ve Yöntem: Kesitsel olan bu çalışma, 2011 yılında Yozgat İl merkezinde yaşayan 1815 yetişkin üzerinde yapılmıştır. Veriler, araştırmacı tarafından literatüre dayalı olarak hazırlanan anket formlarının görüşmeci aracılığıyla doldurulmasıyla toplanmıştır. Verilerin analizinde binary lojistik regresyon kullanılmıştır. Bulgular: Belirlenen 10 SYD'den yetişkinlerde en sık görülenleri; alkol almama, 2 yıl içinde kan basıncını ölçtürmek, sigara içmemek, 5 yıl içinde kolesterol ve 3 yıl içinde kan şekerini ölçtürmek (sırasıyla %91.0, 78.2, 67.0, 56.9, 54.8) iken, en düşük oranda görülenleri; yeterli egzersiz yapmak, yemeklerde yağ kısıtlamak, tuz kısıtlamak, yeterli sebze-meyve tüketmek ve normal beden kitle indeksine sahip olmaktır (sırasıyla %23.7, 26.4, 29.6, 30.0, 35.6). Yetişkinlerin %22.5'i 1-3 SYD'ye, %20 .8'i ise 7-10 SYD'ye sahiptir. Herhangi bir kronik bir hastalığı olanlar, kadınlar, yaşı büyük, öğrenim ve ekonomik düzeyi yüksek olanlar, daha yüksek oranda SYD'ye sahiptir. Tartışma: Sağlığın korunması ve yükseltilmesi için "sağlıklı yaşam davranışlarının" hem aile sağlığı merkezlerinde çalışan sağlık personeli tarafından izlenmesi hem de kamu spotları, okul ve iş sağlığı hizmetlerinde bu konunun üzerinde durulması önerilmektedir.

Anahtar Kelimeler

Sağlık Davranışları; Yaşam Tarzı; Prevalans; Yetişkinler

Abstract

Aim: Lifestyle preferences are closely associated with cardiovascular disease and all deaths. The aim of this study was to establish the relationship between demographic factors and prevalence of 10 healthy lifestyle behaviors (HLSB) in adults. Material and Method: This is a cross-sectional study. The study was conducted on 1815 adults living in the central province of Yozgat, in 2011. The data was collected via questionnaire from, prepared by the researchers based on the literature, by filling through the interviewer. Data were analyzed by binary logistic regression analysis. Results: In adults, determination of 10 HLSBs were more common seen; not alcohol intake, within 2 years blood pressure measured, not smoking, within 5 years cholesterol, and within 3 years blood sugar measured (91.0, 78.2, 67.0, 56.9, 54.8% respectively), and the lowest rates were seen sufficient exercise, restraining salt and fat intake, adequate fruit and vegetable consumption, and have a normal body mass index (23.7, 26.4, 29.6, 30.0, 35.6% respectively). While 22.5% of the participants have three or fewer HLSBs, 20.8% had seven and above HLSBs. With any chronic disease ones, female, the age of older ones, high levels of education and economic ones have higher rates of HLSBs. Discussion: To health promotion, "healthy lifestyle behaviors" should be followed by health personnel who working in family health centers, and it should be focused on this subject by the public spotlight, the health services of school and occupational as well as.

Keywords

Health Behavior; Lifestyle; Prevalence; Adults

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Introduction

Life style preferences are related to cardiovascular diseases and all-cause mortality [1]. The studies have proved that life style including maintenance of optimal weight, healthy and balanced diet, regular physical exercise, moderate alcohol consumption and being non-smoker reduced the risk for developing cardiovascular disease [2-4]. The Nurses' Health Study and Health Professionals Follow-up Study found that the subjects with duration of healthy life style of more than 16 years had 62-80% reduction in coronary events [4,5]. The benefit of healthy life style behavious is not only limited to life-long application. The studies proved that the subjects shifted their life style to healthy form after 45 years old might get 35% reduction in cardiovascular events in following 4 years [2].

Sixty three percent of all deaths are due to non-communicable disaeses in the world and 30% of these deaths stem from cardiovascular diseases. 80% of deaths due to non-communicable disease occur in countries with low or middle income. One-fourth of deaths related to non- communicable diseases take place in subjects under 60 years old. The majority of premature deaths can be prevented by adapting healthy lifestyle behaviours (HLSB). Of these HLSB, non-smoking, sufficient physical activity, healthy nourishment and modearate alcohol consumption are especially important [6].

According to the World Health Organization (WHO) Global Health Risks Report, the first eight of 10 major risk factors for mortality in middle and high income countries including Turkey are high blood pressure, smoking cigarette, high body mass index, unsufficient physical activity, excess alcohol consumption, high blood glucose, high cholesterol and low vegetable-fruit consumption in order which are high risk states and behaviours [6].

These eight risk factors consist of 61% of all mortality due to cadiovascular diseases, three fourth of mortality due to ischemic heart diseases and are responsible for reduction of 5 years in life expectancy at birth [7]. Additionally, early diagnosis and prompt treatment of high blood pressure, high blood glucose and high cholesterol are an efficient approach to reduce effect non-communicible diseases [6]. Eleven-year cohort study from England searched relation between mortality risk and having behaviours such as non-smoking, adequate vegetable-fruit consumption, sufficient physical activity, and low level alcohol consumption. The patients with 3, 2, 1 or none of these healthy behaviours had greater relative risk for all-cause mortality (1.39, 1.95, 2.52 and 4.04 respectively) and for mortality due to cardiovascular diseases (1.59, 2.47, 3.36 and 5.02 respectively) [8]. Smoking induces cardiovascular mortality by increasing resting heart rate in addition to accelerating atherosclerosis [9].

According to Turkey Burden of Disease Study 2004, 6 of the first 10 diseases leading to mortality and again 6 of the first 10 Years Lost due to Disability (YLD) burdens are consisted of chronic diseases. In Turkey, the first 7 risk factors leading to Disability Adjusted Life Years (DALY) for both genders are high blood pressure, high body mass index, smoking cigarette, high cholesterol, unsufficient physical activity, low vegetable-fruit consumption, excess alcohol consumption in order [10]. Among these risk factors, high blood pressure, high blood glucose and high cholesterol can be controlled by deferring other risky behaviours and repeating the measurements regularly. Recent studies held in Turkey as PatenT-2, TURDEP-II, Chronic Diseases and Risk Factors Survey in Turkey haven't mentioned about measurement frequency of these three factors [11-13]. Thus, questioning of HLSB by physicians and nurses from primary health centers is important for maintenance and improvement of public health.

The aim of this study was to search frequency of 10 healthy lifestyle behaviors and their relation with demographic factors by multi variables analysis among adults residing in Yozgat province center.

Material and Method

This cross-sectional study was held in Yozgat province center at 2011 among subjects 18 years old and over. According to the data of 2010 from Turkish Institute of Statistics, there were 75,012 residents in Yozgat province center and 51,000 of them were 18 years old and above [14]. Systematic sampling method was used to determine sample size. One twenty fifth of household and workplaces were included into the sampling process. Of workplaces with less than 25 workers, all subjects were enrolled. If more than 25 workers, 25 of them were sampled randomly.

The data were collected from the questionnaire prepared in accordance with the literature by the interviewers. Intern nurses trained by the researchers served as the interviewer. The height, weight and waist circumference were measured by the experienced intern nurses. 1837 subjects were evaluated, however 22 of them were excluded due to lack of relevant data. Total of 1815 subjects were included in the study for the analysis. Informed consent of each subject, ethical and official approval from the local authorities were obtained for the study accordingly and the investigation was performed in accordance with the principles outlined in the Declaration of Helsinki.

The data were obtained from the questionnaire by intern nurses unblinded to the subjects' data. All subjects were informed about the study before answering the questionnaire. The items of the questionnaire were prepared to measure socio-demographic characteristics and healthy life style behaviors. Measuring his/her blood pressure within the last two years, measuring his/her blood glucose within the last three years, checking her/his lipid profile within the last five years, sufficient vegetables-fruit consumption (at least three times a day), sufficient physical exercise (at least three days a week, at least 150 minutes in total), reduction of fat and salt consumption for food, having normal body mass index (BMI) (BMI of <25 kg/m2), being non-smoker and not drinking alcohol were determined as items of HLSB. The subjects were classified according to number of HLSB items as follows: 1-3 as insufficient; 4-6 as moderate HLSB and 7 and more as sufficient HLSB.

The subjects were questioned when and whether they had measured their blood pressure, blood glucose or lipid profile for any reason. The height of the subjects was obtained by stadiometer without shoes and the weight was measured by electronic scale while the subjects were in casual clothes. Pre-pregnancy weights of the pregnant subjects were questioned to use for the analysis. BMI was calculated for every subject by using weight (in kg) divided by square of height (in meter) formula.

WHO classification was used for the analysis as follows: no risk as BMI of <25 kg/m2; overweight as BMI of 25.0-29.9 kg/m2; and obese as BMI of ≥30 kg/m2 [15].

Statistical Analysis

The data were evaluated by using SPSS package program. For statistical assessment, chi-square test and binary logistic regression analysis with backward LR method were used [16]. Logistic regression analysis was applied unless Goodness of fit test (Hosmer and Lemeshow Test, p>0.05) was suitable. The subjects were classified as 0 (none of HLSB items existed) or 1 (any of HLSB was found) and put in backward LR analysis as dependent variables. Each item of HLSB was analyzed separately and independent variables with statistical significance were shown in the table along with their odds ratio (OR) and 95% confidence interval (CI). Out of independent variables; gender, marital status and presence of any chronic illness was classified as categorical variables while age, educational level and income level were accepted as ordinal variables. A p value <0.05 was accepted to be statistically significant.

Results

In the study group, 53.8% of the subjects were female, 79.8% were married. The range of the ages was between 18 to 90 years old and average age was 40.3±14.2 years with median value of 38 years old. 35.7% of the subjects were primary school graduate while 20.2% were graduated from at least four-year faculty of a university. 82.5% of male subjects and 26.1% of female subjects were an employee. 37.8% of the subjects claimed that they had high level of income while 36.5% had low income. 28.7% of the subjects reported that they had at least one chronic illness of any type (Table 1). 71.8% of the subjects stated that they were happy in their lives and 65.2% reported to be healthy in their lives. 80.1% of the subjects claimed that they had applied to any health facility of any type, and 19.5% of the subjects admitted to any health facility said that it was primary health center.

In the study, frequencies of HLSB in higher rates were as follows: not consuming any alcohol (91.0%); measuring blood pressure within the last two years (78.2%); being non-smoker (67.0%); measuring lipid profile within the last five years (56.9%); measuring blood glucose (54.8%) in order while frequencies of HLSB in lower rates were as follows: adequate physical exercise (23.7%); limiting fat consumption (26.4%); limiting salt consumption (29.6%); sufficient vegetable-fruit consumption (30.0%) and having normal BMI (35.6%) (Table 2).

According to backward LR analysis, the possibility to measure blood pressure, glucose and lipid profile at recommended intervals was higher two times in females compared to males (OR=2.54, 1.88 and 1.98 respectively); approximately two times higher among married subjects compared to both single subjects (OR=0.52, 0.60 and 0.48 respectively) and widow/divorced subjects (OR=0.50, 0.83 and 0.48 respectively); and subjects with any chronic illness had significantly 4.17, 2.64 and 3.03 times higher possibility compared to subjects without any chronic illness respectively. The possibilities to measure blood pressure, glucose and lipid profile correlate with increase in age, educational level and income level.

Table 1. The distribution of data regarding socioeconomic variables in respect to gender

	Male n (%)[a]	Female n (%)[a]	Total n (%)[a]
Educational level			
Illiterate	15 (1.8)	134 (13.7)	149 (8.2)
Primary	148 (17.6)	351 (36.0)	499 (27.5)
Middle	131 (15.6)	105 (10.8)	236 (13.0)
High school	201 (24.0)	179 (18.3)	380 (20.9)
Two-year higher school	113 (13.5)	71 (7.3)	184 (10.1)
University	231 (27.5)	136 (13.9)	367 (20.2)
Marital status			
Married	700 (83.4)	749 (76.7)	1449 (79.8)
Single	121 (14.4)	125 (12.8)	246 (13.6)
Divorced/widow	18 (2.1)	102 (10.5)	120 (6.6)
Age groups			
18 – 29	182 (21.7)	239 (24.5)	421 (23.2)
30 – 39	256 (30.5)	300 (30.7)	556 (30.6)
40 – 49	211 (25.1)	217 (22.2)	428 (23.6)
50 – 59	110 (13.1)	96 (9.8)	206 (11.3)
60 years and above	80 (9.5)	124 (12.7)	204 (11.2)
X (S.S)	40.4 (13.5)	40.3 (14.8)	40.3 (14.2)
Employment status			
Employee	692 (82.5)	255 (26.1)	947 (52.2)
Unemployed	147 (17.5)	721 (73.9)	868 (47.8)
Income level			
Very good	179 (21.3)	153 (15.7)	332 (18.3)
Good	151 (18.0)	203 (20.8)	354 (19.5)
Moderate	234 (27.9)	232 (23.8)	466 (25.7)
Poor	185 (22.1)	258 (26.4)	443 (24.4)
Very poor	90 (10.7)	130 (13.3)	220 (12.1)
Presence of chronic illness			
Absent	661 (78.8)	634 (65)	1295 (71.3)
Present	178 (21.2)	342 (35)	520 (28.7)
Total	839 (46.2)	976 (53.8)	1815 (100)

a Percentages are arranged according to sum of the relevant columns.

The possibility of performing sufficient physical exercise was higher frequency in married subjects than single subjects (OR=0.88) and widow/divorced subjects (OR=0.52) while did not differ statistically in respect to age, gender, educational and income states. The possibility of consuming sufficient amount of vegetable-fruit was higher in female subjects compared to male subjects (OR=1.36) and higher in married subjects compared to single subjects (OR=0.50) and widow/divorced subjects (OR=0.66). Additionally, income level was positively correlated to the possibility of consuming sufficient amount of vegetable-fruit while no difference was found in respect to age, educational level and presence of chronic illness (Table 3).

The possibility of restricting salt or fat consumption was approximately two times higher in subjects with any chronic illness compared to subjects without chronic illness (OR=2.52 and 1.78 respectively). Salt restriction possibility was higher in female subjects (OR=1.28) but fat restriction possibility did not have any relationship with gender. Both salt and fat restriction possibility were increasing significantly with age while they had no statistical relation with marital, educational or income states.

Table 2. The prevalence of 10 healthy lifestyle behaviors in respect to gender.

Risky behaviors		Male (n=839)	Female (n=976)	Total (n=1815)	X^2
		n (%)[a]	n (%)[a]	n (%)[a]	p
Blood pressure	Measured within the last 2 years *	608 (72.5)	812 (83.2)	1420 (78.2)	31.11
	Measured ≥2 years	25 (3.0)	22 (2.3)	47 (2.6)	<0.001
	Not measured	206 (24.6)	142 (14.5)	348 (19.2)	
Blood glucose	Measured within the last 3 years *	412 (49.1)	582 (59.5)	994 (54.8)	20.18
	Measured ≥3 years	27 (3.2)	25 (2.6)	52 (2.9)	<0.001
	Not measured	400 (47.7)	369 (37.8)	769 (42.4)	
Lipid profile	Measured within the last 5 years *	436 (52.0)	596 (61.1)	1032 (56.9)	16.63
	Measured ≥5 years	7 (0.8)	3 (0.3)	10 (0.6)	<0.001
	Not measured	396 (47.2)	377 (38.6)	773 (42.6)	
Physical exercise	≥3 days a week for 150 min *	201 (24.0)	230 (23.6)	431 (23.7)	13.08
	İnsufficient	222 (26.5)	193 (19.8)	415 (22.9)	0.001
	None	416 (49.6)	553 (56.7)	969 (53.4)	
Vegetable-fruit	Consuming ≥3 per day *	228 (27.3)	314 (32.3)	542 (30.0)	18.52
	Consuming 1-2 per day	394 (47.1)	487 (50.2)	881 (48.8)	<0.001
	Consuming <1 per day	214 (25.6)	170 (17.5)	384 (21.3)	
Salt	Without salt/ low amount of salt use *	215 (25.6)	323 (33.1)	538 (29.6)	22.92
	Moderate salt use	452 (53.9)	524 (53.7)	976 (53.8)	<0.001
	Salty/ very high amount of salt use	172 (20.5)	129 (13.2)	301 (16.6)	
Fat	Without fat/ low amount of fat use *	219 (26.1)	260 (26.6)	479 (26.4)	0.46
	Moderate oil use	525 (62.6)	615 (63.0)	1140 (62.8)	0.795
	Fatty/ very high amount of oil use	95 (11.3)	101 (10.3)	196 (10.8)	
BMI	<25 *	289 (34.4)	358 (36.7)	647 (35.6)	143.85
	25 – 29.9	405 (48.3)	240 (24.6)	645 (35.5)	<0.001
	≥30	145 (17.3)	378 (38.7)	523 (28.8)	
Smoking	Non-smoker *	463 (55.2)	753 (77.2)	1216 (67.0)	106.34
	Smoking rarely	50 (6.0)	50 (5.1)	100 (5.5)	<0.001
	Smoking every day	326 (38.9)	173 (17.7)	499 (27.5)	
Alcohol	Non-drinker *	692 (82.9)	954 (97.9)	1646 (91.0)	124.84
	<1 per week	103 (12.3)	16 (1.6)	119 (6.6)	<0.001
	1 per week/ more frequently	40 (4.8)	4 (0.4)	44 (2.4)	
	Total [a]	839 (100.0)	976 (100.0)	1815 (100.0)	

[a] Percentages are arranged according to sum of the relevant columns. * Healthy lifestyle behaviors

The possibility of having normal BMI was significantly higher in female subjects than male subjects (OR=1.29), also was significantly higher in both widow/divorced subjects and single subjects compared to married subjects (OR=2.43 and 2.30 respectively). Additionally it was statistically higher among subjects with chronic illness compared to subjects without chronic illness (OR=0.62). Decrease in age and increase in educational level was significantly correlated to the possibility of having normal BMI however it had no relation with income level.

The possibility of being non-smoking was 3.19 times higher in female subjects than male subjects, single subjects had 1.40 times higher possibility to no smoking compared to married subjects. Similarly, this possibility was 1.32 times higher among subjects with chronic illness than subjects without chronic illness. The possibility increases significantly with aging and educational level but did not differ in respect to income level.

The possibility of not drinking alcohol was 9.7 times higher in females than males. It was increasing with aging (OR=1.04) and lower educational level (OR=0.88) while it did not have any statistical relation with income level (Table 3).

One fifth of the subjects had sufficient healthy lifestyle behaviors while approximately more than half of the subjects had moderate healthy lifestyle behaviors. The frequency of the subjects had 22.5%. Only four subjects had all 10 HLSB items (Table 4).

Discussion

In this study, the relation of socio-demographic factors and healthy lifestyle behaviors of adults living in Yozgat province center was assessed.

In our country, approximately half of people with high blood pressure were aware of their health problem [11,13]. American College of Cardiology recommends measurement of blood pressure once in every two years for normotensive subjects while once a year for prehypertensive subjects [17]. 78.2% of our study population (72.5% of males and 83.2% of females) reported that they had measured their blood pressure within the last two years while 19.2% of them had not measured their blood pressure at all (Table 2). In the studies held in same province center, it was reported that 85.9% of patients admitted to primary health center and 92.3% of health workers had measured their blood pressure within the last two years [18,19]. In PatenT 2003 study from Turkey, 58% of the study population claimed that they measured their blood pressure within the last two years while 32.2% (41.4% of males and 25.8% of females) did not measure their blood pressure at all. Similarly, Health Survey 2012 found that 48.4% of subjects ≥15 years old (39.8% of males and 56.8% of females) had not measured their blood pressure within the last one year [20,21]. InterASIA study from China found that 59.5% of subjects between 35 to 74 years old measured their blood pressure within the last one year and 67.5% measured their blood pressure within the last 5 years [22]. The rate of subjects measured their blood pressure within the last 2 year in our study was higher than that of general population in the country but lower than that of health workers and subjects admitted to primary health centers in same province center.

The prevalence of type II diabetes is increasing in both our

Table 3. Logistic regression analysis of variables which can effect healthy lifestyle behaviors

Independent variables	Healthy lifestyle behaviors (Dependent variables)				
	Subjects measured blood pressure within the last 2 years	Subjects measured blood glucose within the last 3 years	Subjects measured lipid profile within the last 5 years	Subjects performing physical exercise ≥3 days a week for 150 min	Subjects consuming vegetable-fruits ≥3 per day
	O.R.(95% CI)	O.R.(95% CI)	O.R. (95% CI)	O.R.(95% CI)	O.R.(95% CI)
Gender				-	
Male (Ref.)	1	1	1		1
Female	2.54 (1.94-3.31)	1.88 (1.51-2.35)	1.98 (1.57-2.49)		1.36 (1.10-1.67)
Marital status					
Married (Ref.)	1	1	1	1	1
Single	0.52 (0.36-0.74)	0.60 (0.43-0.83)	0.48 (0.34-0.67)	0.88 (0.63-1.22)	0.50 (0.36-0.71)
Widow/ divorced	0.50 (0.28-0.92)	0.83 (0.52-1.34)	0.48 (0.30-0.79)	0.52 (0.31-0.87)	0.66 (0.42-1.04)
Age (year)	1.05 (1.03-1.06)	1.04 (1.03-1.05)	1.05 (1.04-1.06)	-	-
Educational level	1.39 (1.25-1.54)	1.25 (1.14-1.36)	1.35 (1.23-1.48)	-	-
Income level	1.13 (1.01-1.26)	1.24 (1.13-1.36)	1.21 (1.10-1.33)	-	1.20 (1.11-1.31)
Chronic illness					-
Absent (Ref.)	1	1	1	1	
Present	4.17 (2.78-6.24)	2.64 (2.03-3.44)	3.03 (2.30-3.99)	1.23 (0.97-1.57)	
Goodness of fit test (DF; x ^{2}; p)	8; 8.42; 0.394	8; 5.00; 0.757	8; 8.03; 0.431	3; 0.26; 0.967	8; 15.27; 0.54

Independent variables: Gender, marital status and presence of chronic illness (as categorical variables), age (as continuous variables), educational level and income (as ordinal variables); DF: Degrees of freedom, x 2: chi-square, p:Level of significance

Table 3. (cont.)

Independent variables	Healthy lifestyle behaviors (Dependent variables)				
	Salt restriction	Fat restriction	Having BMI of <25 [a]	Being non-smoker	No drinking alcohol
	O.R.(95% CI)	O.R.(95% CI)	O.R. (95% CI)	O.R.(95% CI)	O.R.(95% CI)
Gender		-			
Male (Ref.)	1		1	1	1
Female	1.28 (1.02-1.59)		1.29 (1.03-1.63)	3.19 (2.54-4.01)	9.65 (5.89-15.82)
Marital status	-	-			-
Married (Ref.)			1	1	
Single			2.30 (1.64-3.22)	1.40 (1.01-1.95)	
Widow/ divorced			2.42 (1.43-4.09)	0.80 (0.48-1.33)	
Age (year)	1.03 (1.02-1.04)	1.02 (1.01-1.03)	0.95 (0.94-0.96)	1.04 (1.03-1.05)	1.05 (1.03-1.06)
Educational level	-	-	1.16 (1.08-1.26)	1.12 (1.04-1.21)	0.88 (0.78-0.99)
Income level	-	-	-	-	-
Chronic illness					-
Absent (Ref.)	1	1	1	1	
Present	2.52 (1.96-3.24)	1.78 (1.38-2.29)	0.62 (0.46-0.84)	1.32 (1.01-1.73)	
Goodness of fit test					
(DF; x 2; p)	8; 14.35; 0.073	8; 7.29; 0.506	8; 15.35; 0.053	8; 15.23; 0.055	8; 9.63; 0.292

Independent variables: Gender, marital status and presence of chronic illness (as categorical variables), age (as continuous variables), educational level and income level (as ordinal variables); DF: Degrees of freedom, x 2: chi-square, p:Level of significance

[a] Vegetable-fruit consumption, physical exercise and oil consumption were added into the model.

country and the world, however 46% of diabetic patients in our country and 44.5-46% of diabetic patients in the world live without a diagnosis of diabetes [11,23,24]. Canadian and American Diabetes Associations recommend measurement of blood glucose once in every 3 years for healthy subjects and once in every one or two years for subjects with impaired glucose tolerance [25,26]. 54.8% of the subjects in the study (49.1% of males and 59.5% of the females) reported that they measured their blood glucose within the last 3 years while 42.4% did not measure their blood glucose at all (Table 2). As expected, the rate of measuring blood glucose among health workers and subjects admitted to primary health centers in same city was higher (measured within the last 2 years, 82.8% and 57.1% respectively) than our findings [18,19]. According to Health Survey 2012, 33% of subjects ≥15 years old (25.9% of males and 39.9% of females) measured their blood glucose within the last one year [21]. This finding was similar to ours projecting three-year duration of our study into general population of Turkey.

In the study from USA, it was found that 31.5% of subjects with high cholesterol were not aware of their health problem [27]. It is recommended that healthy adults over than 20 years old should check their lipid profiles once in every 5 years while subjects with heart disease or high lipid levels should check their lipid profiles once in every 1 or 2 years [28]. In our study, 56.9%

Table 4. Number of positive healthy lifestyle behaviors in respect to gender

	Male	Female	Total	Cumulative
Number of HLSB	n (%)	n (%)	n (%)	%
0	4 (0.5)	0 (0)	4 (0,2)	0.5
1	40 (4.8)	7 (0.7)	47 (2,6)	2.6
2	91 (10.8)	40 (4.1)	131 (7,2)	9.8
3	135 (16.1)	94 (9.6)	229 (12,6)	22.5
4	168 (20.0)	172 (17.6)	340 (18,7)	41.2
5	145 (17.3)	188 (19.3)	333 (18,3)	59.6
6	116 (13.8)	239 (24.5)	355 (19,6)	79.2
7	88 (10.5)	151 (15.5)	239 (13,2)	92.4
8	40 (4.8)	71 (7.3)	111 (6,1)	98.6
9	10 (1.2)	12 (1.2)	22 (1,2)	99.8
10	2 (0.2)	2 (0.2)	4 (0,2)	100.0
Total [a]	839 (100.0)	976 (100.0)	1815 (100.0)	

HLSB: Healthy lifestyle behavior

of subjects (52% of males and 61.1% of females) claimed that they measured their lipid profile within the last 5 years while 42.6% did not check at all (Table 2). This ratio was similar to that of subjects admitted to primary health center of same province (55.9%) but lower than that of health workers (82.6%) [18,19]. According to Health Survey 2012, 30.4% of subjects ≥15 years old (24% of males and 36.7% of females) were measured their lipid profiles within the last one year [21]. According to BRFSS 2011 from USA, the rate of subjects measured their lipid profile within the last 5 years was 76.2% [29]. Our results showed that our study population was more sensitive than general population in Turkey but less sensitive than general population in USA about measuring lipid profile.

According to backward LR analysis, the possibility to measure blood pressure, glucose and lipid profile at recommended intervals was higher two times in females compared to males; approximately two times higher among married subjects compared to both single subjects and widow/divorced subjects; and subjects with any chronic illness had significantly 2.6-4.2 times higher possibility compared to subjects without any chronic illness respectively. The possibilities to measure blood pressure, glucose and lipid profile correlate with increase in age, educational level and income level (Table 3).

Four point three percent of disease burden of Turkey [10], 2.1% of the world disease burden (4.1% of disease burden of developed countries) and 6% of all-cause deaths have been attributed to insufficient physical activity [6]. In our study, 23.7% of subjects claimed to perform sufficient physical exercise while 53.4% of the subjects reported not physical exercise (Table 2). The rate of sufficient physical exercise was higher than the results of Turkish Adult Risk Factor Study Survey (23% for females and 13.3% for males) and Turkey Nutrition and Health Survey (14.5-21.7% for subjects between 19-64 years old) but was similar to the rate among health workers (11.1-26.9%) [12,18,30,31]. WHO reported that the rate of sufficient physical activity in middle-upper income countries was 59% [6]. In USA data for 2011, it was found that 52.9% of adults claimed to perform at least 150 minutes per week as moderate level of physical exercise [29]. It was detected that 63.7% of adults in Turkey Burden of Disease Survey had sufficient physical activity [10]. The possibility of performing sufficient physical exercise was higher frequency in married subjects than single subjects (OR=0.88) and widow/divorced subjects (OR=0.52) while did not differ statistically in respect to age, gender, educational and income states (Table 3).

Consumption of at least ≥3.5 portions of vegetable-fruit per day is recommended by National Health Interview Survey from USA [32]. In our country, 9.0% of all deaths, 3.9% of disease burden were attributed to insufficient vegetable-fruit consumption (4.5% and 2.4% for Europe respectively) [7,10]. In our study, 30.0% of the subjects were consuming vegetable-fruit thrice or more per day while 21.3% noted that they did not consume vegetable-fruit every day. In Turkish population, the rate of subjects consuming vegetable-fruit 5 or more times a day was 13.3% [12]. According to Turkey Nutrition and Health Survey 2010, 47.6% of general population consumed green leafy vegetables, 34.9% consumed other vegetables, 16.2% consumed citrus-type fruits and 51.9% consumed the other fruits for every day. Additionally, fresh vegetable-fruit consumptions by male and female subjects aged between 19-74 years were 461.5-603.9 grams (approximately 5 portions) and 484.5-581.3 grams (approximately 5 portions) respectively [33]. The rate of sufficient vegetable-fruit consumption by health workers in same province center was 13% [18]. In USA, it was 24% among adults and in Europe, it was 44% according to WHO data [7,34]. Our findings were similar to general populations of Turkey and USA but less than European region in respect to vegetable-fruit consumption.

Daily recommended amount of salt consumption by WHO is less than 5 grams [15]. In Turkey, average daily salt consumption was found to be 18 grams by SalTurk study in 2008 and this amount was dropped to 14.8 grams by SalTurk-2 in 2012. However these values are three times of daily recommended amount [13,35].

Number of subjects limiting salt use in their diets (29.6%) was higher than that of subjects (25%) in Turkey Burden of Disease Study 2003 [10]. 88.3% of adults in the world consume salt more than recommended amount and average amount of consumption is 9.88 grams (3.95 gr of sodium) [36]. The possibility of salt restriction in diet was 2.5 times higher in subjects with any chronic illness compared to subjects without chronic illness and higher in female subjects (OR=1.28). It was increasing significantly with age while they had no statistical relation with marital, educational or economical states (Table 3).

All over the world, especially in high income countries, increase in fat consumption is observed. It is recommended that less than 30% and less than 10% of total energy in diet should be composed of fats and saturated fatty acids respectively [6]. 26.4% of our population reported fat restriction in diet. Turkey Nutrition and Health Survey 2010 found that subjects aged between 19-74 years old obtained 33.5-35.5% of total energy from fats while in USA, it was 33% (10.6% from saturated fatty acids) [33,37]. According to USA data of 2007-2010, two third of adults over 19 years and above consumed fat more than recommended amount [38]. It was thought that actually the fat content in so-called food with normal fat content can be more than recommended amount since two third of the study population (64.4%) were overweight/obese. Fat restriction possibility

did not have any relation with gender, marital, educational or economical states however fat restriction possibility were increasing significantly with age and presence of chronic illness (Table 3).

35.6% of the study population had BMI of <25 kg/m2 and 28.8% of the subjects (38.7% of female subjects and 17.3% of male subjects) were obese. According to Turkey Nutrition and Health Survey 2010, 36.7% of the subjects over 19 years old and above had BMI of <25 kg/m2, and according to Turkey Health Survey 2012, it was 48.1% among subjects over 15 years old and above had BMI of <25 kg/m2 [21,33]. The frequency of having BMI <25 k/m2 in our study population was similar to findings of Turkey Nutrition and Health Survey.

The possibility of having normal BMI was significantly higher in female subjects, in both widow/divorced subjects, single subjects and subjects without chronic illness. Additionally decrease in age and increase in educational level was significantly correlated to the possibility of having normal BMI however it had no relation with income level (Table 3).

67.0% of subjects (55.2% of males and 77.2% of females) reported that they had no smoking cigarette (Table 2). The possibility of being non-smoker was higher in female, single subjects and subjects with chronic illness. The possibility increases significantly with aging and educational level but did not differ in respect to income level (Table 3). According to Turkey Health Survey 2012, 73.2% of subjects over 15 and above (59.8% of males and 86.2% of females) were non-smoker and it was 72.9% (58.5% of males and 86.9% of females) according to Global Adult Tobacco Survey Turkey 2012. It was 68.8% found by the same survey held in 2008 [21,31,39]. It seems that percentage of non-smokers is increasing in our country. In USA (2011), 81.7% of the study population reported to be non-smoker [29]. In our study population, ratio of non-smokers was lower than USA and Turkey. The reason of this result may be due to inclusion of the subjects aged 18 years old and above while inclusion criteria was 15 years and above in the study involving general population of Turkey.

Of the subjects, 91.0% (82.9% of males and 97.9% of females) claimed that they didn't drink alcohol (Table 2). The possibility of non-drinker for alcohol was 9.7 times higher in females than males (Table 3). According to Turkey Health Survey 2012, %89.6 of the subjects (82.8% of males and 96.2% of females) were non-drinker, it was 87% in Chronic Diseases and Risk Factors Survey in Turkey [12,21]. In the study held at 2003, the rate of non-drinkers was 80.1% (64.8% of males and 92.0% of females) [10]. In USA, 75.0% of adult population drink alcohol at moderate level [29]. According to Turkey Nutrition and Health Survey 2010, consumption of alcoholic beverages was 5.3 times higher in males than females at ages between 19-30 years old and 26.4 times higher in males than females at ages between 31-50 years old [33]. Both findings of our study and general population confirmed that consumption of alcoholic beverages was too low. The rate of non-drinkers in our study population was similar to that of general population.

In the eleven-year cohort study from England, the relation of mortality and HLSB (non-smoking, alcohol consumption of <14 units per week, sufficient vegetable-fruit consumption, sufficient physical exercise) standardized according to age, gender, BMI and socio-economical class was searched. Providing presence of 4 HLSB as reference (relative risk=1), the relative risk ratios of subjects with 3, 2, 1 and 0 HLSB for all-cause mortality were 1.39, 1.95, 2.52 and 4.04 respectively and the relative risk ratios for cardiovascular mortality were 1.59, 2.47, 3.36 and 5.02 respectively [8].

One fifth of the subjects had sufficient HLSB while approximately more than half of the subjects had moderate HLSB. The frequency of the subjects had 22.5% of 1-3 HLSBs. Only four subjects had all 10 HLSB items (Table 4). Kaw et al. found that percentages of subjects with 0, 1, 2, 3 and 4 HLSB were 1.2, 9.3, 27.9, 40.2 and 21.3% respectively for males and 0.7, 5.0, 18.1, 37.1 and 39.1% for females [8]. In our study, these values were 0.2, 2.6, 7.2, 12.6 and 18.8 respectively for the study population.

Conclusion

The ratio of subjects with ≥6 of leading 10 HLSBs for prevention of non-communicable diseases was higher females (48.7%) than male (30.5%). In study population, the most frequent HLSBs (≥50% in frequency) were as follows: non-drinkers for alcohol, measuring blood pressure within the last two years, non-smoking, measuring lipid profile within the last 5 years and blood glucose within the last 3 years. It was recommended that public ads, school and workplace services about healthy lifestyle behaviors should be implemented by health workers in primary health centers to protect public health and to prevent early mortality.

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Competing interests

The authors declare that they have no competing interests.

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